NEVADA COOPERATIVE SNOW SURVEYS

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Part II. Humboldt River Basin, Eastern and Southern Nevada, National Wildlife Refuges

Final Seasonal Snow Survey and Kindred Data, April 1, 1944

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Issued in cooperation with the Nevada Agricultural Experiment Station, United States Division of Irrigation of the Soil Conservation Service, Forest Service, Bureau of Reclamation, Weather Bureau, Geological Survey, Fish and Wildlife Service, Humboldt River Water Users, Nevada State Engineer, Elko-Lamoille Power Company, and Wells Power Company.

Nevada Agricultural Experiment Station
Reno, Nevada

HUMBOLDT RIVER BASIN

CENTRAL AND SOUTHERN NEVADA, AND WILDLIFE REFUGES

Plans and Progress

The plans of establishing a substitute snow-survey course at 76 Creek for upper Marys River Basin, a series of courses in Salmon Falls River Basin, and a line of low-level snow courses across the floor of upper Humboldt Basin still await realization but have lost none of their insistence.

Controlling them all is the present lack of manpower that has temporarily caused the curtailment of some of the snow surveys. Great credit is due the Forest Service, however, for the high priority given snow-surveying that comes just when rangers are being transferred to other forest posts. To meet emergencies, rangers are sent from other forests. The members of the C. O. camp in Antelope Valley have eagerly shared in snow surveying in the Mono and Toiyabe Forests.

Stream gaging in the Humboldt Basin has now entered its final stage of development. An increase in appropriation by the Legislature has made possible the further extension of cooperative stream gaging especially in the Humboldt River Basin. The U. S. Geological Survey has installed continuous recorders on lower Marys River, North Fork, upper Lamoille Creek, and upper Humboldt River at Moleen Canyon near Carlin.

A series of gaging stations is now planned for the Humboldt below each principal feeder to determine the contribution of various cross-sections of the watershed, such as the Wells-Bishop Creek, Marys River, Starr-Secret, North Fork, Lamoille, South Fork, and Maggie-Susie areas. These will be provided with continuous recorders which will be maintained throughout the year. The South Fork station has been established since 1897 but the North Fork station is only now established permanently.

Supplementing these should be gages where possible on the principal tributaries where they emerge from the mountains to determine the difference in essential character between the runoff of the mountain streams and the broad valley stream of the main Humboldt.

The stations on upper Starr, Secret, and South Fork are still being maintained by the Nevada Agricultural Experiment Station and a new station has been established this spring on Maggie Creek at Carlin. Most essential though difficult to maintain is a proposed station at the head of Marys River to compare the upper mountain stream and the lower alluvial stream made sluggish by practically continuous dams.

The effect of high water-table surmised as the cause of the excess runoff in the upper Humboldt above the pereentage indicated by the snow cover seems now to be proved by the near normal runoff of the south feeders in 1943 and the double normal runoff of the

main stream at Palisade. Evidently much of the snow-melt usually absorbed by the alluvial basin was turned directly into the stream channel.

The winter runoff, being immediately subject to temperature, is not so reliable an indicator of the relative height of the water table as are the wells but should be further studied for its possible value.

In Southern Nevada through cooperation of the U. S. Forest Service and Army, continuous measurements of precipitation and temperature are being made on Charleston Mountain in the vicinity of the snow-fields, thus providing weather data more indicative of snow accumulation and melting.

An enlarged snow-weather station has now been established by the U. S. Weather Bureau at Paradise Valley as an index for the Little Humboldt Basin and permanent precipitation-temperature stations have become a feature of the wild-life refuges at Sheldon and Ruby Lake.

For purposes of confirmation and comparison the precipitation recorded by the U. S. Weather Bureau as well as the survey of the snow cover will be continued as a permanent feature of the forecasts.

I. HUMBOLDT BASIN

1. Past Season, 1942-43

Effect of High Water-Table

The water year of 1942-43 because of the normality of its weather features has provided an opportunity to confirm the potency of high water-table on the runoff of the upper Humboldt and determine its relative effect.

The only questionable factor is that of precipitation and snow cover. The former for November-February was 137.6 percent of normal and the snow cover March 1 91.5 percent of normal but at low levels only 42.1 percent. Fortunately in the Central Sierra with almost identical conditions of precipitation and snow cover, the percentage of runoff was closely similar to that of the snow at the higher levels. Therefore, for pusposes of comparison the snow cover in the Humboldt Basin may be considered reliable and its effectiveness as approximating 91.5 percent of its normal.

The precipitation during March-July, the period of runoff, was near or slightly below normal except for the month of June when the precipitation was 100 to 240 percent in excess of normal.

On the other hand, at Elko and Lamoille, except for excess temperature of +4.8° and +7.4°F respectively in April, the temperature was at or below normal and in June when the precipitation was heaviest the temperature departure was lowest or respectively -5.6° and -5.0°F. at the two stations.

The winter runoff at Palisade was 125,330 acrefeet or 435.2 percent of normal, an unprecedented occurrence, but a part of this was flood water in January and February.

The wells in Humboldt and Lamoille Valleys in March were higher than for previous years of record, except 1942 in the former. More exactly, in Elko Valley the wells were 1.65 feet higher than the group normal of 11.62 feet (below the surface of the ground) and in Lamoille Valley were 0.84 feet higher than their group normal of 4.24 feet.

This excess, intensified probably by the heavy priming of the soil in the floods of January and February, created a total runoff for March-July of 216.2 percent of normal or 125 percent of normal above the 91.5 percent of the snow cover.

In sharp contrast with this excess is the runoff of 92.4 percent (March-July normal) on the South Fork of the Humboldt near Elko as it leaves its mountain valley to join the main Humboldt. This close relationship to the snow cover is corroborated by the records near Elko on South Fork (90 percent) and on Starr Creek

(121.8 percent) where they leave the mountains.

Though not possible the present season, this phenomenon may ultimately recur under even more favorable conditions for estimating its individual effect. Even the present season of 1943-44 in which the snow cover is more uniform ~~irrespective~~ of altitude harmonious with the winter precipitation and the wells are still slightly above normal can yield informative data. The winter runoff though only 63.7 percent of its normal is higher than in the previous seasons of low water-table such as the winter of 1940-41 when continuous summer rains of double normal quantity started the water table's rise.

Temperature and Precipitation during Runoff Season 1943

Temperature Departure from Normal

oF

	March	April	May	June	July
Upper Humboldt					
Tuscarora	-1.54	+0.15	-0.26		
Arthur	-1.98	-1.13	+0.68	+2.11	-0.39
Lamoille	-1.19	+0.70	-0.90	+2.35	-0.36
Hylton	-0.34	-0.20	-0.49		
Little Humboldt					
Paradise Valley	-0.28	-0.08	-0.29	+0.74	-0.24
Orovada	-0.53	+0.12	-0.14	+0.49	-0.17

Precipitation Departure from Normal

In.

	March	April	May	June	July
Upper Humboldt					
Tuscarora	-1.54	+0.15	-0.26	-0.26	
Arthur	-1.98	-1.13	+0.68	+2.11	-0.39
Lamoille	-1.19	+0.70	-0.90	+2.35	-0.36
Hylton	-0.34	-0.20	-0.49		
Little Humboldt					
Paradise Valley	-0.28	-0.08	-0.29	+0.74	-0.24
Orovada	-0.53	+0.12	-0.14	+0.49	-0.17

Review of the 1943 Forecasts

The effect of the high water-table was anticipated but was erroneously applied also to Lamoille Creek and South Fork which it has now been learned are immune.

The following table gives the final results as compiled from cooperative data by the U. S. Geological Survey and the Nevada State Engineer's office.

	Normal Flow acre feet	Forecasted Flow acre feet	percent of normal	Actual Flow acre feet	Divergence in percent of normal
Humboldt River at Palisade (March-July period)	215,000 (new normal)	395,000	184	464,930	+32.2
Lamoille Creek at Power House (April-July period)	22,800	48,790	214	26,480 est.	-97.9
South Fork Humboldt River at Bolton Ranch (April-July period)	35,000	65,100	186	35,290 est.	-85.2
Martin Creek, Little Humboldt Basin, at U. S. Gaging Station (March-July period)	20,320 (new normal)	25,400	125	27,310	+9.4

The flow of the main Humboldt at Palisade even exceeded the final forecast of 184 percent by 32.2 percent. Could the soil already provided with the highest water table of recent record have become additionally primed by the floods of January and February?

On the other hand, the southern feeders Secret Creek as it leaves the mountains and South Fork as it enters the main Humboldt failed to be affected by the high water table noted in the alluvial valley of the main Humboldt and flowed at approximately the percentage of normal represented by the snow cover (Starr Creek: Snow cover 97.4, runoff 121.8 and South Fork: Snow cover 70.1, runoff 90.0).

Fortunately the record on South Fork is based on a normal of 38 years, the station is rated as good by the U. S. Geological Survey, and the record for 1942-43 is continuous.

The records of three neighboring streams upper South Fork, Lamoille Creek, and Starr Creek where they leave the foothills of the high Ruby Mountains show the same trend despite their fragmentary condition caused by withdrawal of the state hydrographer into War Service.

These records as interpolated for missing months are as follows:

		Percentage of Normal	
South Fork (Boltons)	Snow Cover	70.1;	114.6 est.
Lamoille Creek (near Lamoille	" "	97.9;	121.2 est.
Starr Creek	" "	97.4;	121.8 est.
Main Humboldt (Palisade)	" "	91.4;	193.0

Because of lack of records, the seasonal period of the tributaries except lower South Fork (near Elko) is confined to April-July, During this period the main Humboldt flowed 193.0 percent as contrasted with 216.2 percent for the period of March-July.

Since upper South Fork (at Bolton) has no alluvial valley above it and scant water table, its percentage of runoff should be even less than on the lower South Fork (near Elko). Both are the selfsame stream except for tributaries entering below. By the new normal of 44,000 acrefeet (mean of the six years, 1937-1942) the percentage is 114.6 percent. Similarly by a new 6-year normal on the other streams compared, the trends are visible.

At the lower end of Lamoille Valley, where the water table has a wide fluctuation, and in Marys River Basin, known for its gentle gradient and continuous dams, the runoff tends upward toward that of the main Humboldt in the former and far exceeds it in the latter.

The percentages for April-July are as follows:

Lower Lamoille Creek (McIntyres)	140.1 percent
Marys River (Cabin Field)	279.3 percent
Main Humboldt River (Palisade)	193.0 percent

Lamoille Creek flows quickly and only a relatively short distance from its mountain rim to the south while Marys River flows far and sluggishly from its mountain basin in the far north.

If more and better records were available, it would be possible to trace the influence of the ground water-table up the various finger basins of the Humboldt which comprise its source. But plainly this influence does not extend above the canyon throats nor up the V-shape valleys where the gradient is steep.

Runoff 1943

(Acre feet)

Marys River in Cabin Field (April-July)	82,380
North Fork at U. S. Highway 40 (April-July)	Gage washed out.
Maggie Creek at U. S. 40 (April-July)	Hydrographer in Service
Susie Creek at U. S. 40 (April-July)	
Marys Creek at Carlin	
Starr Creek in Lower Starr Valley (April-July)	
Secret Creek above 71 Ranch (April-July)	
Lamoille Creek at Power House (April-July)	31,560 est.
Lamoille Creek at McIntyres (April-July	41,370
Rabbit Creek in Seitz Canyon (May-July)	
South Fork at Bolton Ranch (April-July)	50,420 est.
South Fork at Bullion (March-July)	76,490
Humboldt River in Moleen Canyon (April-July	Cable and staff gage washed out.
Humboldt at Palisade (March-July)	464,930
Humboldt at Callahan Station (March-July)	Flooded out
Humboldt Inflow into Rye Patch Reservoir (March-July)	460,190
Rye Patch Reservoir-Storage July 31 (Total usable capacity 178,100)	168,400
Pitt-Taylor Reservoir-Storage July 31	15,000
Little Humboldt River at Chimney Dam Site (March-July)	25,689
Martin Creek near Paradise Valley (March-July)	27,310

NEW STREAM-FLOW NORMALS AND RUNOFF DATA

South Fork Humboldt River near Elko-- M. T. Wilson

Medians and normals in acre-feet by months
38 complete years 1897-1909; 1911-18; 1922; 1924-32; 1937-43

Median	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
Median	904	1,330	1,360	1,410	1,980	5,940	10,320	21,490	29,100	6,610	636	274	89,830
Average	1,060	1,670	1,830	2,560	3,920	8,220	12,720	22,150	29,980	8,840	1,340	534	94,800

Average Nov.-Feb. 9,980
Mch.-July 81,910

Monthly Runoff in Acre-Feet in Humboldt Basin 1943-44 (U. S. Geological Survey)

Gaging Station	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1. Marys River near Deeth, Nev.	(10-31) 87	540	800	920	1,150	2,580	
2. No. Fk. Humboldt River near Deeth, Nev. (at Devils Gate)	(16-31) 740	1,310	1,110	800	1,380	7,060	6,850
3. Lamoille Creek near Lamoille, Nev.	(18-31) 170	360	310	310	290	300	600
4. South Fork Humboldt River near Elko, Nev.	620	1,440	1,080	1,000	1,100	4,850	
5. Humboldt River near Carlin (Moleen Canyon)	(17-31) 680	3,870	4,610	6,150	7,470	24,600	
6. Humboldt River at Palisade, Nev.	2,180	4,740	5,990	5,780	9,340	29,990	
7. Little Humboldt River at Chimney Dam Site near Paradise Valley, Nev.	120	130	150	185	230	550	
8. Little Humboldt River at Hot Springs near Paradise Valley, Nevada	(13-31) 300	540	490	550	630	920	
9. Martin Creek		518	514	565	595	928	
10. Rye Patch Reservoir - contents Acre-Feet (last day of month)		143,650	147,850	152,750	156,610	167,360	

2. Present Season, 1943-44

FORECAST SUMMARY

Basins	Snow Cover March 1 Percent of Normal	Percentage Effect of Water-Table (Basis of 1942 and 1943)	Normal Runoff Mar-July Acre feet	Probable Flow Percent of Normal		Possible Minimum Flow Percent of Normal	
					Acre feet		Acre Feet
Humboldt River at Palisade	73.5	20.0	215,000 (new)	94	202,100	74 to 59	159,000 to 126,850
Northern Feeders	64.3	Slight to 25 percent on Marys River		65 to 90 on Marys River		65 to 50	
Southern Feeders	82.8	None		33		83 to 68	
Lamoille Creek at Power House	83.4	None	26,040 6 yrs. (Apr.-July)	83	21,613	68	17,700
South Fork at Boltons	86.3	None	44,000 (Apr.-July) 6 yrs.	86	37,840	71	31,240
Martin Creek near Paradise	97.0*		20,320 (new)	97	19,700	82	16,660
Quinn River	97.0			97		82	
Reese River	98.6			99		84	

*March 1 only 54.5

FORECAST DATA FOR PRESENT SEASON

1943-44

Percent of Normal

1. Snow Cover

Snow Cover March 1	High-level	Low-level	Precip. Nov.Feb.
North Feeders	65.4	63.6	76.1
Weighted, High L. 1 to Low L. 2		64.2	
South Feeders	82.8	133.4?	64.5
Average		82.8	
Lamoille	83.4		69.3
Upper Humboldt	73.5		
Average		73.5	
Little Humboldt- Quinn River	54.5*		90.6
Reese River			98.6
Snow Cover April 1			
North Feeders	48.1	0	23.9
South Feeders	82.1	0	43.5
Lamoille	81.7		45.3
Upper Humboldt	65.1	0	33.7
Little Humboldt-Quinn River	94.9*		70.7
Reese River			

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*Surveys March 1 54.5%, but April 1 94.9% an unusual occurrence.

11. Water Table, March 1
(as shown by well measurements)

	Normal Level Feet below surface*		Depth to water	Departure
Elko Valley	7 wells	11.62; 5 wells 13.97	5 wells 10.50 (ft.)	+3.47
Lamoille Valley	5 wells	4.24	4.14	+0.10

*Elko normal based on 1938-43; Lamoille 1935-43.

Elko wells measured Apr. 1, Lamoille wells Mar. 1

The water table, tho lower than in 1943, a year of 100 percent of normal excess flow, is still apparently above normal and indicates that the percentage of runoff indicated by the snow cover should be realized unless the summer precipitation is greatly deficient.

111. Winter and March Runoff

The winter runoff should at minimum represent the effect of the water table but at maximum can be the effect of high temperature and rain. The past winter, however, has been generally cold and rainless. The precipitation has also been considerably below normal. This has been especially true of March. Yet the runoff for these periods has been steady, though now falling in April.

Runoff of Humboldt at Palisade

	Normal	1944	Percentage of normal
Nov.-Feb.	28,600	18,347	63.7
March	32,600	29,990	92.0
(April	47,200	34,375	72.8)

IV. Temperature during March

oF

	Mean	Departure	Mean above freezing	Departure
Upper Humboldt Elko	32.6	-5.0	9.2	-0.9
Little Humboldt-Quinn-Winnemucca	36.2	-3.8	8.8	-1.6
Reese River Austin				

V. Precipitation during March

	Normal	Percent of normal
Upper Humboldt		
North Feeders	1.42	23.9
South Feeders	1.82*	43.5
Lamoille	1.90	45.3
Little Humboldt-Quinn River	0.89	70.7
Reese River	1.52	

*Weighted

VI Snow Cover Change in March

	Normal Key Courses only (1935-41) in. (Water Equiv. in.)	Key Courses in. (Water Equiv. in.)	1944 General Average (Water Equiv. in.)	Percentage Snow Survey Mar. 1 High-Level	Percentage Snow Survey Mar. 1 Low-Level
Upper Humboldt					
North Feeders	-0.01	-0.8	-3.0	-26.5	Ground bare
South Feeders	+1.7	+0.05	-0.2	- 1.0	
Lamoille	+1.7	+0.05	-0.2	- 1.6	
Little Humboldt Quinn River			+4.3	+ 42.6	
Reese River			-2.4		

VII Runoff during March

Acre feet

	Normal	1944	Percent of normal
Marys River near Deeth		2,580	
North Fork at Devils Gate		7,060	
Lamoille Creek at Power House		300	
South Fork near Elko	8,220	4,850	59.0
Humboldt near Carlin (Moleen Canyon)		24,600	
Humboldt at Palisade	32,600	29,990	92.0
Martin Creek above Paradise Valley	3,610	928	25.7
Little Humboldt at Chimney Dam Site		550	
Little Humboldt at Hot Springs		920	

VIII. Summary

The present season the snow cover on the Northern Feeders of the upper Humboldt is 20 percent of normal lower than on the Southern Feeders and the latter is only 83 percent.

In the Little Humboldt Basin the snow cover of 54.5 March 1 appeared to have increased to 94.9 percent April 1.

On the basis of precipitation measurements, the snow cover in the Reese River Basin is again approximately normal.

March has been cold and the precipitation for the month very light. The March runoff has therefore been unusually low, If precipitation continues low, the percentage of runoff for the season indicated by the snow cover may fall 15 percent.

The high water-table on the main Humboldt should increase the flow at Palisade by 20 percent of normal and may be effective in the broad Lamoille Valley and on the more level portions of the Northern Feeders, such especially as the lower Marys River basin, providing the present system of dams on the latter permits any further rise in its water-table. That the latter basin is subject to its water table is demonstrated by the runoff of 279.3 percent (April-July normal) in 1943, considerably higher than the main stream at Palisade (193 percent) for the same period. Lamoille Valley, however, is far less subject to its water table if its percentage of 140.1 for this period is approximately accurate. The normal of both streams are the average for the past 6 years unweighted.

Because of the thin snow cover of 64 percent the Northern Feeders should fall early despite the low temperature of March while the thicker snow cover of 83 percent on the high Ruby Range should assure a heavier and later flow of the Southern Feeders.

The thin snow cover of the Northern Feeders should also be reflected in the runoff of the Little Humboldt, whose eastern branch rises in their midst. Its northern branch and other feeders in the Santa Rosa Range should be more nearly normal if the increase in the snow cover there during March is realized.

[illegible]

[illegible]

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APRIL 1 SNOW SURVEY DATA

1. UPPER HUMBOLDT BASIN

Temperature departure March, Elko (5,077 ft.) -5.0°F (Mean 32.6°F)
Mean temperature above freezing 9.2°F (Normal 10.1°F)

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent inches	Normal water equivalent Mar. 1	Percentage of Mar. 1 normal	Seasonal precip. and percentage of normal at U.S.W.B. Stations March
Northern Feeders								
Marys River								
Bear Creek	8,100					20.6		Jarbidge-Mala Vista
Fox Creek	6,900					11.1		(6,100-5,585 ft.)
Marys River	8,000					20.3		0.99 in.
Marys River-North Fork								
Big Bend	6,800	Apr. 2	18.6	30.1	5.6	12.1	46.3)43.5	
Gold Creek R.S.	6,600						40.7)	
NORTH Fork								
Jack Creek	7,800	Apr. 4	19.7		7.5	11.6	64.7)	North Fork-Tuscarora-
Jack Creek	7,000	Apr. 4	0	0	0	7.3	)	Owyhee (6,500-5,400 ft.)
Rodeo Flat	7,000	Apr. 4	20.7	31.4	6.5	14.3	45.5)52.7	(Normal 1.42 in.)
Fry Canyon	6,800	Apr. 5	23.3	27.9	6.5	13.6	47.8)	0.34 in.; 23.9%
Tremewan Rch.	5,600	Apr. 4	0	0	0	4.0		
Susie-Maggie Creeks								
Taylor Canyon	5,200	Apr. 4	0	0	0	7.7		

AVERAGE OF NORTHERN FEEDERS

Higher Levels 48.1
Lower Levels 0

23.9%

APRIL 1 SNOW SURVEY DATA

1. UPPER HUMBOLDT BASIN (Cont.)

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent inches	Normal equivalent Mar. 1	Percentage March 1 normal	Seasonal precip and percentage of normal at U.S.W.B. stations March
Southern Feeders								
Trout-Starr-Secret Creeks								Arthur-Wells (6,500-5,633 ft.)
Trout Creek	8,500					24.9		
Trout Creek	6,900					8.4		(Normal 1.66 in.)
Dorsey Basin	8,100					14.7		
Dry Creek	6,500					8.3		0.66 in; 39.8%
Ryan Ranch	5,775					3.0		
Lamoille-Rabbit Creeks								
Lamoille Canyon	9,000	Apr. 3	62.6	34.7	21.7	24.1	90.0)	Lamoille-Elko
Lamoille Canyon	9,000+	Apr. 3	58.1	34.4	20.0	27.4	73.0)	(6,290-5,077 ft.)
Lamoille Canyon	8,500	Apr. 2	46.8	36.5	17.1		)	
Lamoille Canyon	8,100	Apr. 1	33.6	36.3	12.2	15.0	81.3)82.1	Norm. 1.90 in.)
Lamoille Canyon	7,600	Apr. 1	31.2	35.1	10.6	12.8	82.8)	0.86in.; 45.3%
Lamoille Canyon	7,400	Apr. 1	28.7	35.5	10.2	12.2	83.6)	

+ Cross course

APRIL 1 SNOW SURVEY DATA

1. UPPER HUMBOLDT BASIN (Continued)

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent inches	Normal water equivalent March 1	Percentage of March 1 normal	Seasonal precip. and percentage of normal at U.S.W.B. March
Southern Feeders (Cont.)								
South Fork								Hylton-Ruby Lake
Ruby Lake								(7,081-6,200 ft.)
Corral Canyon	8,500					14.5		
Green Mountain	8,000					17.3		(Normal Hylton 1.83 in.)
Harrison Pass No. 2	7,400							
Harrison Pass No. 1	6,600					7.8		
Hager Canyon	8,500							
Cave Creek	7,000							
AVERAGE OF SOUTHERN FEEDERS					(Higher Levels		82.1*	43.5
					(Lower Levels			
AVERAGE UPPER HUMBOLDT					(Higher Levels		65.1	
					Lower Levels		0	33.7

*The average for the Southern Feeders is computed by weighting the three groups of stations representing South Fork, Lamoille Creek, and Starr Creek on the basis of 2, 1, and 1/2 representing their relative contributions to the flow of the main Humboldt.

APRIL 1 SNOW SURVEY DATA

11. LOWER HUMBOLDT BASIN

Temperature departure March Winnemucca (4,287 ft.) -3.8°F (Mean 36.2°F.)
Mean temperature above freezing 8.8°F (Normal 10.4°F)

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent inches	Normal water equivalent March 1	Percentage of Mar. 1 normal	Seasonal precip. and percentage of normal at U.S.W.B. stations March
Rock Creek-Little Humboldt								
Midas	7,000	Apr. 4	3.0	30.0	0.9			Paradise Valley, Orovada (4,650-4,300 ft.) 0.63 in. (Norm. 0.89 in.); 70.7%
Lamance Creek	7,000		No. meas.			12.6		
Granite Peak	8,600	Mar. 24	35.9	36.2	13.0	13.6	95.6)	
Martin Creek R.S.	7,000	Mar. 24	22.0	30.9	6.8	7.9	86.1) 94.9	
Upper Buckskin Mt.	8,200	Mar. 27	30.0	38.3	11.5	10.3	111.6)	
Lower Buckskin Mt.	6,800	Mar. 26	24.6	32.9	8.1	9.4	86.2)	
AVERAGE LITTLE HUMBOLDT BASIN							94.9	70.7%

Temperature departure March, Austin (6,594 ft.)
Mean temperature above freezing oF (Normal 7.7°F)

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent inches	Normal water equivalent March 1	Percentage of Mar. 1 normal	Seasonal precip. and percentage of normal at U.S.W.B. stations March
Reese River Basin								
Big Creek								
Upper Big Creek	8,000	Apr. 5	24.4	29.5	7.2			Austin (6,594 ft.) (Normal 1.52 in.)
Cabin Course (Middle)		Apr. 5	2 (new)*	0	T			
Big Creek Camp Ground		Apr. 5	1 (new)*	0	T			
Upper Corral	8,500	Apr. 4	17.3	29.5	5.1			
Lower Corral	7,500	Apr. 4	0	0	0			

*New snow incapable of measurement

CHANGE IN SNOW COVER AT ALL STATIONS DURING MARCH
(Inches water)

1. UPPER HUMBOLDT BASIN

Temperature Departure Elko (5,077 ft.) -5.0°F (Mean 32.0°F); Mean temperature above freezing 9.2°F (normal 10.1°F)

Northern Feeders

	Marys River			Marys River-North Fork		
	Bear Creek (8,100 ft.)	Fox Creek (6,900 ft.)	Marys River (8,000 ft.)	Big Bend (6,800 ft.)	Gold Creek R.S. (6,600 ft.)	Precipitation at Jarbidge Mala Vista (6,100 - 5,585 ft.) Normal in.
March 1	14.3	9.5	15.4	6.4	4.0	
April 1				5.6	0	0.98
Gain or loss				-0.8	-4.0	

North Fork

	Jack Creek (7,800 ft.)	Jack Creek (7,000 ft.)	Rodeo Flat (7,000 ft.)	Fry Canyon (6,800 ft.)	Tremewan Ranch (5,600 ft.)	Precipitation at North Fork-Tuscarora-Owyhee (6,500-5,400 ft.) Normal 1.42 in.
March 1	9.4	4.8	10.1	8.2	2.9	
April 1	7.5	0	6.5	6.5	0	0.34
Gain or loss	-1.9	-4.8	- 3.6	-1.7	-2.9	

Susie-Maggie Creeks

	Taylor Canyon (5,200 ft.)
March 1	4.2
April 1	0
Gain or loss	-4.2

AVERAGE NORTHERN FEEDERS Gain or loss in snow cover -3.0 in.; precip. 0.66 in.; temp. dep. -5.0°F (Mean above freezing 9.2°F)

CHANGE IN SNOW COVER AT ALL STATIONS DURING MARCH

(Inches water)

1. UPPER HUMBOLDT BASIN (Cont.)

Southern Feeders

Trout-Starr-Secret Creeks

	Trout Creek (8,500 ft.)	Trout Creek (6,900 ft.)	Dorsey Basin (8,100 ft.)	Dry Creek (6,500 ft.)	Ryan Ranch (5,775 ft.)	Precip. at Arthur-Wells (6,500-5,633 ft.) Normal 1.66 in.
March	11.9	0	12.4	5.9	4.0	0.66
April 1		0				
Gain or loss						

Lamoille-Rabbit Creeks

	Lamoille (9,000 ft.)	Lamoille (9,000 ft) cross course	Lamoille (8,500 ft.)	Lamoille (8,100 ft.)	Lamoille (7,600 ft.)	Lamoille (7,400 ft.)	Precip. at Lamoille-Elko (6,200-5,077 ft.) Normal 1.90 in.
March 1	21.7	22.5	16.1	13.0	10.5	9.3	0.86
April 1	21.7	20.0	17.1	12.2	10.6	10.2	
Gain or loss	0	- 2.5	+ 1.0	- 0.8	+ 0.1	+ 0.9	

South Fork-Ruby Lake

	Corral Canyon (8,500 ft.)	Green Mt. (8,000 ft.	Harrison Pass #2 (7,400 ft.)	Harrison Pass #1 (6,600ft.)	Hagar Canyon (8,500ft.)	Cave Creek (7,000 ft.)	Precip. at Hylton-Ruby Lake (7,081-6,200 ft.) Normal 1.83 in. (Hylton)
March 1	16.2	12.6	6.6	5.0			
April							
Gain or loss							

AVERAGE SOUTHERN FEEDERS Gain or loss in snow cover -0.2 in.; Precip. 0.76 in.; Temp departure -5.0°F (Mean above freezing 9.2°F)

Runoff from Upper Basin at Palisade during March 29,990 A.F. (Normal 32,600 A.F.)

CHANGE IN SNOW COVER AT ALL STATIONS DURING MARCH

(Inches water)

11. LOWER HUMBOLDT BASIN

Temperature Departure Winnemucca (4,287 ft.) -3.8°F (Mean 36.2°F)
Mean temperature above freezing 8.8°F (Normal 10.4°F)

Rock Creek-Little Humboldt	Midas (7,000 ft.)
March 1	4.8
April 1	0.9
Gain or loss	-3.9

Little Humboldt Basin	Lamance Creek (7,000 ft.)	Granite Peak (8,600 ft.)	Martin Creek R.S.(7,000 ft.)	Upper Buckskin (8,200 ft.)	Lower Buckskin (6,800 ft.)	Precip. at Paradise-Orovada (4,650-4,300 ft.) Normal 0.89 in.
March 1	7.0	7.4	3.8			
April 1		13.0	6.8	11.5	8.1	0.63 in.;
Gain or loss		+ 5.6	+3.0			70.7%

AVERAGE LITTLE HUMBOLDT BASIN Gain or loss in snow cover +1.6 in.; precip. 0.63 in.; temp. dep. -3.8°F Mean above freezing 8.8° F)

Martin Creek 928 A.F. (Normal 3,000 A.F.); 30.9%

Reese River Basin

Temperature departure Austin (6,594 ft.) °F (Mean 35.8°F)
Mean temperature above freezing °F (Normal 7.7°F)

	Upper Big Creek (8,000 ft.)	Big Creek Cabin	Big Creek Camp Ground	Reese River Upper Corral (8,500 ft.)	Reese River Lower Corral (7,500 ft.)	Precip. at Austin (6,594 ft.) Normal 1.52 in.
March 1	7.3	1.4	2.0	9.8	3.9	
April 1	7.2	T	T	5.1	C	
Gain or loss	- 0.1	- 1.4+	-2.0+	- 4.7	-3.9	

AVERAGE REESE RIVER BASIN. Gain or loss in snow cover -2.4 in.; precip. in.;

(Mean temp. above freezing °F)

No runoff records available.

<u>Main Humboldt River</u>

Precipitation stations only.

Precip. at Battle Mt.-Winnemucca- Rye Patch Dam-Lovelock (4,513-3,977 ft.), Normal 0.65 in. (except Rye Patch)

0.46 in.; 70.8%

Runoff Palisade 29,990 A.F. (Normal 32,600 A.F.); 92%

Storage in Pitt-Taylor Reservoirs......15,000 A.F. (Jan. 1)

Runoff Callahan Gaging Station near Imlay

Storage in Rye Patch Reservoir Apr. 1...167,360 (Max. storage capacity 178,100 A.F.

PAST RECORD 1941-1943 OF CHANGE IN WATER CONTENT OF SNOW COVER AT KEY STATIONS DURING MARCH
(For 1935-1942 see Report for April 1, 1942)

	Northern Feeders				Southern Feeders										
	Snow Cover		Precipitation (U.S.W.B.) North Fork-Tuscarora-Owyhee (5,400-6,500 ft.) Mar. Normal 1.42 in.		Lamoille (7,400 ft.)	Lamoille (7,600 ft.)	Lamoille (8,100 ft.)	Lamoille (9,000 ft.)	Precipitation (U.S.W.B.) Lamoille (6,100 ft.) Mar. (Normal 2.83 in.)		Mean Temperature Elko (5,077 ft.)		Snow Cover April 1 (Percent of March 1 normal)	Runoff at Palisade for March	
	Fox Creek (6,900 ft.)	Big Bend (6,800 ft.)									Departure (Normal 37.6°F)	Mean Temp. above freezing (Normal 10.1°F)		Percent of normal March Runoff (32,600 A.F.)*	Percent of normal March-July Runoff (215,000 A.F.)
AVERAGE FOR PERIOD 1935 - 1941	-0.2	-0.01	Total 1.31	Dept. -0.11	+0.8	+0.8	+1.5	+3.6	Total 2.04	Dept. -0.79	-0.5	9.3			
1941															
March 1	7.6	9.9			10.2	9.4	11.2	22.7							
April 1	5.7	9.7			7.1	8.4	10.2	24.5							
Gain or loss	-1.9	-0.2	0.32	-1.10	-3.1	-1.0	- 1.0	+ 1.8	2.11	-0.72	+1.4	11.2	58.6	56.0	8.5
1942															
March 1	9.8	10.2			12.4	12.7	13.3	23.8							
April 1	8.5	10.4			13.1	13.7	14.8	28.9							
Gain or loss	-1.3	+ 0.2	0.46	-0.96	+ 0.7	+ 1.0	+ 1.5	+ 5.1	2.23	-0.60	2.7	7.0	83.9	191.8	29.1
1943															
March 1	9.6	16.3			11.7	12.0	13.7	31.6							
April 1		15.3			10.7	10.8	13.5	35.0							
Gain or loss		- 1.0	0.71	-0.71	- 1.0	- 1.2	- 0.2	+ 3.4	1.64	-1.19	+0.1	17.0	89.5	340.5	51.6
1944															
March 1	9.5	6.4			9.3	10.5	13.0	21.7							
April 1		5.6			10.2	10.6	12.2	21.7							
Gain or loss		- 0.8	0.34	-1.08	+0.9	+0.1	- 0.8	0	1.34	-1.49	-5.0	9.2	73.6	92.0	13.9

*Relationship of March normal to March-July normal is 15.2%

CHANGE IN SNOW COVER AT LOW LEVELS DURING MARCH
(Inches water)
1941-1944

	Northern Feeders				Southern Feeders		
	Fry Canyon (6,800 ft.))	Gold Creek (6,600 ft.)	Tremewan Ranch (5,775 ft.)	Taylor Canyon (5,200 ft.) :	Harrison Pass (6,000 ft.)	Dry Creek (6,500 ft.)	Ryan Ranch (5,775 ft.)
1941							
March 1	9.2	6.2	3.2	8.3	5.4	6.6	0.4
April 1	8.8	6.0		4.6	3.4	3.1	0
Gain or loss	-0.4	-0.2		-3.7	-2.0	-3.5	-0.4
1942							
March 1	10.5	8.1	4.1	8.5	6.5	7.6	4.3
April 1	9.0	7.7	0.5	6.4	5.6	8.4	0.9
Gain or loss	- 1.5	-0.4	-3.6	-2.1	-0.9	+0.8	-3.4
1943							
March 1	10.7	10.9	2.3	4.4	2.3+	4.8	0.8
April 1	8.7	8.9	0	0	0	0	0
Gain or loss	-2.0	- 2.0	-2.3+	-4.4+	-2.3+	-4.8+	-0.8+
1944							
March 1	8.2	4.0	2.9	4.2	5.0	5.9	4.0
April 1	6.5	0	0	0	0		
Gain or loss	-1.7	-4.0+	-2.9+	-4.2+			

Average loss in snow cover: 1941......1.7+; 1942......1.6 in.; 1943......2.7in.; 1944......3.2 in.

11. EASTERN NEVADA

The full complement of snow courses is now being surveyed but normals are not yet available.

In Steptoe Valley, the snow cover is as heavy as in 1943 and increased slightly during March despite the apparently above-normal temperature at Ely.

In Baker Creek, the snow cover on both March 1 and April 1 is 30 percent in excess of last season and the largest of snow-survey record.

EASTERN NEVADA

1944

APRIL 1 SNOW SURVEY DATA

Temperature Departure March Ely (6,257 ft.) +10.0°F (Mean 42.5°F) Mean temp above freezing 5.2°F
Mean temperature Lehman Caves Nat. Mon. (7,200 ft.) 32.2°F; above freezing 6.6°F

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent ins.	Normal water equivalent Mar. 1 ins.	Percentage of: Mar. 1 normal	Precipitation (U.S.W.B.)
Steptoe Valley								March Ely (6,257 ft.) Normal 1.19 in. Lehman Caves Nat. Mon. (7,200 ft.) Normal
Murray Summit	7,500	Apr. 1	3.8	38.4	5.3			1.57 in.
Baker Creek								
Baker Creek #3	9,230	Apr. 1	67.0	33.6	22.5			At Ely only, precip. 0.89; departure -0.30 in.
Baker Creek #2	8,950	Apr. 1	59.9	34.2	20.5			
Baker Creek #1	7,950	Apr. 1	24.5	29.4	7.2			

CHANGE IN SNOW COVER DURING MARCH
(Inches of water)

	Steptoe Valley Murray Summit (7,500 ft.)	Precipitation (U.S.W.B. Ely (6,257 ft.) Inches and percentage of normal (Normal 1.19 in.)		Baker Creek		Precipitation (U. S. W. B.) Lehman Cave Nat. Mon. (7,200 ft.) Inches and percentage of normal 1.12 in.
			Baker Creek No. 3 (9,250 ft.)	Baker Creek No. 2 (8,950 ft.)	Baker Creek No. 1 (7,950 ft.)	
1941						
March 1	4.2	0.93 in.;				
April 1	0.7	78.2%				
Gain or loss	- 3.5					
1942						
March 1	3.7	1.03 in.;	21.3	15.6	5.3	
April 1	2.5	86.6%		17.6	2.9	2.42
Gain or loss	- 1.2			+ 2.0	-2.4	

The snow cover in Steptoe Valley though slightly less on March 1 this year than last has lasted much longer into the season.

	Steptoe Valley Murray Summit (7,500 ft.)	Precipitation (U.S.W.B. Ely (6,257 ft.) Inches and percentage of normal (Normal 1.19 in.)	Baker Creek No. 3 (9,250 ft.)	Baker Creek No. 2 (8,950 ft.)	Baker Creek No. 1 (7,950 ft.)	Precipitation (U. S. W. B.) Lehman Cave Nat. Mon. (7,200 ft.) Inches and percentage of normal 1.12 in.
1943						
March 1	5.0		13.0	12.8	6.0	
April 1	0	0.44 in.;	16.9	16.2	5.6	1.15 in.
Gain or loss	- 5.0+	37.0%	+ 3.9	+ 3.4	- 0.4	
1944						
March 1	5.2	0.89 in.;		17.0*	10.1**	
April 1	5.3	74.8%	22.5	20.5	7.2	
Gain or loss	+0.1			+ 3.5	-2.9	2.25 in.

* corrected 17.0 in.
** Corrected 10.1 in.

111. SOUTHERN NEVADA

The snow cover on Mount Charleston is much the same this season as that of 1942, considered approximately normal.

Owing to the low precipitation during March, however, the snow residue averages somewhat less.

SOUTHERN NEVADA

APRIL 1 SNOW SURVEY DATA

Temperature departure March, Las Vegas A. P. +1.2° (Mean 55.0°F)
Mean temperature Charleston R.S. °F

Elevation feet	Date	Snow depth inches	Density percent	Water equivalent ins.	Normal water equivalent ins. March 1	Percentage of Mar. 1 normal	Precipitation (U.S.W.B.) ins. and percentage March normal
Charleston Mt.							
Kyle Canyon 8,200	Mar. 30	29.3	44.4	13.0			
Kyle Can. 7,400	abandoned						
Rainbow Canyon 7,800	Mar. 30	34.2	32.8	11.2			Charleston R.S. 0.43 in. Las Vegas A.P. 0.06 in.; 17.6%
Lee Can. 9,000	Apr. 1	24.2	31.8	7.7			
Lee Can. 8,300	Apr. 1	24.3	31.3	7.6			

CHANGE IN SNOW COVER DURING MARCH
Charleston Mountains

	Kyle Canyon (8,200 ft.)	Kyle Canyon (7,400 ft.)	Rainbow Canyon (7,800 ft.)	Lee Canyon (9,000 ft.)	Lee Canyon (8,300 ft.)	Precipitation U.S.W.B. March Charleston R.S. (7,165 ft.)
1941						
March 1	18.9	11.7	22.4	20.6	16.5	3.52
April 1	18.5	6.9	21.4	20.8	16.3	
Gain or loss	- 0.4	- 4.8	- 1.0	+ 0.2	- 0.2	
1942						
March 1	8.8	5.4	10.5	9.9	7.8	1.86
April 1	9.5	4.0	11.0	15.2	11.3	
	*0.7	-1.4	+0.5	+ 5.3	+ 3.5	

The snow cover this year is less than half of last but probably is normal
Last year the precipitation was approximately 250 percent of normal.

CHANGE IN SNOW COVER DURING MARCH (Continued)

Charleston Mountains

	Kyle Canyon (8,200 ft.)	Kyle Canyon (7,400 ft.)	Rainbow Canyon (7,800 ft.)	Lee Canyon (9,000 ft.)	Lee Canyon (8,300 ft.)	Precipitation(U. S. W. B.) inches March Charleston R.W. (7,165 ft.)
1943						
March 1	15.7	(abandoned)	16.7	17.4	13.9	
April 1*			15.0		7.3	
Gain or loss			- 1.7		- 6.6	Las Vegas Airport 153.0%
	*Apr. 13-14					
1944						
March 1	12.9		12.2	8.9	9.3	Charleston R.S. 0.43 in.
April 1	13.0		11.2	7.7	7.6	Los Vegas Airport 0.06 in.; 17.6%
Gain or loss	+0.1		-1.0	-1.2	-1.7	

IV. WILDLIFE REFUGES

1. Sheldon Antelope Refuge

The snow courses are the barest of record and the March precipitation is only 57.5 percent of normal. The temperature for March is -1.5°F low.

2. Ruby Lake Refuge

Owing to absence in Service of the observer familiar with the snow courses and failure of the forecasters to learn this situation in time to provide a substitute, no records of snow cover are available. The survey will be resumed next season.

WILDLIFE REFUGES

APRIL 1 SNOW SURVEY DATA

Sheldon National Antelope Refuge (Northern Washoe County)
Temperature Departure March Sheldon -1.5°F (Mean 30.0°F); Mean above freezing 5.2°F(Normal 10.2°F)

Elevation feet	Date	Snow depth inches	Density percent	Water equivalent ins.	Normal water equivalent Mar. 1	Percentage of March 1 normal	Precipitation (U.S.W.B.) inches and percentage of normal March
Bald Mountain Peterson Canyon and Bald Mountain Cr. Mahogany Mountain 6,720 ft.	Apr. 1	0		0			Sheldon (6,500 ft.)
Virgin 5,680 "		0		0			(Normal 1.13 0.65 in.; 57.5%

Ruby Lake National Wildlife Refuge, (Southern Elko County)
Temperarure departure March, Elko -5.0°F (Mean 32.6°F)
Mean temp. above freezing 9.2°F (Normal 10.1°F)

Elevation feet	Date	Snow depth inches	Density percent	Water equivalent ins.	Normal water equivalent Mar. 1	Percentage of March 1 normal	Precipitation (U.S.W.B.) inches and percentage of normal March
Hagar Canyon 8,500		No meas.					Arthur (6,500 ft. 0
Cave Creek 7,000		No meas.					(Norm. 2.24 in.) 0.56 in.; 25.0%

GAIN OR LOSS OF SNOW COVER DURING MARCH

(Inches of Water)

	Sheldon Refuge				Ruby Lake Refuge	
	Bald Mountain Creek (6,720 ft.)	Mahogany Mt. Virgin (5,680 ft.)	Precipitation (U. S. W. B.) Inches and percentage of normal Sheldon (6,500 ft.) (Norm. 1.13 in.)	Hagar Canyon	Cave Creek	Precipitation (U.S. W.B.) Inches and percent of normal Ruby Lake
1941						
March 1	5.9	5.3	0.15 in.;	14.8		0.80 in.
April 1	3.8	0	13.3%	15.6	11.9	
Gain or loss	- 2.1	- 5.3+		+ 0.8		
1942						
March 1	6.2	3.0	0.25 in.;	21.0	16.2	1.18 in.
April 1	4.5	0	22.1%	23.5	16.6	
Gain or loss	- 1.7	-3.0+		+ 2.5	- 0.4	

At Sheldon Refuge snow conditions the present year are much the same as last except that Virgin watershed appears to be barer. At Ruby Refuge the snow cover is 50 percent better than last.

	Bald Mountain Creek	Mahogany Mt. Virgin	Precipitation Sheldon	Hagar Canyon	Cave Creek	Precipitation Ruby Lake
1943						
March 1	7.7	0.7		19.1	14.6	
April 1	4.3	0	0.71 in.;	17.1	8.8	1.48 in.
Gain or loss	-3.4	-0.7+	62.8%	- 2.0	- 5.8	Arthur 11.6%
1944						
March 1	3.4	2.3				
April 1	0	0	0.65 in.;			Arthur 0. 56 in.;
Gain or loss	- 3.4+	-2.3+	57.5%			25.0%

PART I. CENTRAL SIERRA QUADRANGLE

Part I, embracing the eastern slope of the Central Sierra Quadrangle, is issued separately by the Forecast Committee of the Nevada Cooperative Snow Surveys and can be obtained upon request to the Chairman, Prof. H. P. Boardman, 735 West Street, Reno, Nevada.

J. E. Church

H. P. Boardman
Forecasters

Nevada Agricultural Experiment Station
Reno, Nevada, May 5, 1944

Seasonal Snow Survey and Forecast of Stream Flow — April, 1944
Nevada Co-operative Snow Surveys

PART I—CENTRAL SIERRA QUADRANGLE

Including the Truckee, Tahoe, Carson and East and West Walker Basins of the Eastern Slope

CO-OPERATION

The organizations co-operating in the surveys of this region are: The Nevada Co-operative Snow Surveys, including the State of Nevada, through the State Engineer's office, the Truckee-Carson Irrigation District, the Washoe County Water Conservation District and the Sierra Pacific Power Co.; the California Co-operative Snow Surveys headed by the Division of Water Resources of the Department of Public Works at Sacramento and including the Pacific Gas & Electric Co. and the Nevada Irrigation District, whose employees make the surveys of several of the courses used in this forecast; the U. S. Forest Service; and the Division of Irrigation of the U. S. Soil Conservation Service. The Division of Irrigation is the organization which is developing and co-ordinating the snow surveys throughout the western states. All of the above organizations contribute financially to the work.

The U. S. Weather Bureau and the Agricultural Experiment Station at the University of Nevada are also co-operating in various ways.

PART II. Humboldt Basin and Miscellaneous is prepared under the direction of Dr. J. E. Church of the Agricultural Experiment Station, University of Nevada.

REVIEW OF LAST YEAR

As the following table will show, the actual resulting runoff checked within less than 5% of normal with the predictions made in our Forecast Bulletin published last April, with the exception of the East Walker River, where actual results exceeded the forecast by a relatively large amount.

Two important snow courses in the East Walker Basin Center Mountain and Buckeye Forks were not surveyed in 1943 and very likely too low an estimate was made of the probable water equivalent on those courses when working up the forecast. Also perhaps the unusually high precipitation of November 1942 raised the water table in Bridgeport Valley enough to materially decrease the usual spring loss due to percolation and evaporation in that valley.

Due to the high level of Lake Tahoe carried over from the previous year it was necessary to open the outlet gates and release large quantities of water to prevent a rise above the stipulated maximum elevation of 6229.10.

1943 RESULTS

BASIN OR STREAM	Normals	1943 Forecast		Actual Results	
		% of Normal	Amount	Amount	Normal % of
			Feet	Feet	
Lake Tahoe *Rise April 1 to High Water	1.68	101.2	1.70	1.62	96.4
*Maximum Elevation	July 10		6229 90	6229.82	July 13
Maximum Controlled Elevation			6229.10	6229.02	July 13
			Acre feet	Acre feet	
Truckee River—Exclusive of Tahoe natural flow	325,700	92.1	300,000	297,830	91.4
Carson River at Ft. Churchill	230,000	100	230,000	234,900	102.1
West Walker near Coleville	191,200	91.0	174,000	175,650	91.9
East Walker below Bridgeport Dam	73,000	82.2	60,000	82,330	11.28

*Assuming gates closed—no outflow.

OUTLOOK FOR 1944

The winter precipitation has been much below normal as will be seen by reference to the table of April 1, 1944 Snow Survey Data and also the table of Winter Precipitation "Seasonal Progress Tahoe City" at the bottom of the last page. The seasonal snow surveys as shown in the April 1 table indicate quite consistent results in the different water sheds, most of the high altitude surveys along the main range of the Sierras being between 60 and 65% of normal while some of the lower altitude courses were proportionately better. The courses along the Carson Range, which extends northerly and southerly from the east side of Tahoe, also show a higher percentage of normal in water equivalent than the high level courses along the main range. The reason for this is that several of our fairly good storms during the past winter came from the east instead of directly in from the ocean and in some cases gave actually more water equivalent precipitation on this Carson Range than the same storms did on the main range.

Since last fall's precipitation in the form of rain was deficient it may take more of the melting snow this spring to fill up the ground water table than would have been the case with normal fall precipitation so that unless extra spring precipitation is received the results will probably be somewhat less than is indicated by the snow surveys.

TRUCKEE RIVER

The estimated runoff of the Truckee River not including Lake Tahoe and also corrected for storage on the Little Truckee is 195,000 acre feet for the April-July period. The normal proportional distribution of flow over the four specified months is indicated on the last page. However, temperature has a very large effect on this distribution of flow so that the relative amounts of different months may in any one year differ widely from the indications of the table.

LAKE TAHOE

The behavior of Lake Tahoe this season will be very different from that of last year since there is no danger of the lake approaching the high water limit placed by stipulated agreement so the draft of water from the lake by opening of gates will depend upon down-the-river requirements instead of being forced by high water danger.

The elevation of Lake Tahoe on April 1 was 6226.80 and the rise for the period from April 1 to high water is estimated at 0.90 feet assuming gates kept closed for that period thus bringing the lake to elevation 6227.70 close to the date June 15. This will be nearly a foot and a half below the stipulated maximum permissible elevation.

CARSON RIVER

The forecast for the Carson River runoff at Fort Churchill is based mainly on the snow survey results at Carson Pass and Blue Lakes but the expectant runoff in a low year is much lower proportionately than the snow survey alone would indicate. The reason for this is that extensive irrigation and valley losses take place in Carson Valley soon after the water from the east and west forks comes out of the mountains and many miles above the gaging point at Fort Churchill. There are also smaller diversions enroute and especially in the neighborhood of Dayton. The storage in Lahonton Reservoir on April 1 was 265,000 acre feet, only 25,000 acre feet below maximum capacity.

WEST WALKER

The estimated runoff of the West Walker at the gaging station between Coleville and the junction of the West Fork and the East Fork of the West Walker is 110,000 acre feet. Topaz Reservoir contained 49,400 acre feet storage on April 1.

EAST WALKER

Runoff at Bridgeport Dam is estimated at 33,000 acre feet for the April-August period, corrected for change in storage in the reservoir. This is the stream that greatly over-ran our estimates in 1943 as discussed in the reviw of last year on page 1.

The behavior of Bridgeport valley as to ground water storage, evaporation losses, etc., quite frequently introduces undetermined factors having considerable effect on the accuracy of the forecast. Bridgeport Dam contained 40,400 acre feet on April 1.

1944

PROGRESS SNOW SURVEYS DURING THE WINTER

Basin	Snow Course	Altitude of Snow Course	1944 Date of Survey	Depth of Snow Inches	Density % Water	Water Equiv. Inches	April 1 Normal Water Equiv.	April 1 % of Normal	Year 1943	
									% of April 1 Normal	Date
Crest and South Yuba	Furnace Flat	6600	2/9	77.6	28.9	22.4	(59)	38.0	53.9	2/ 3/43
			3/2	117.6	29.0	34.1	(59)	57.8	70.0	3/ 2/43
			3/5	140.7	30.9	43.5	(59)	73.7		
	Fordyce Lake	6500	2/7	62.8	33.0	20.7	(51)	40.6	56.1	2/ 3/43
			2/8	75 0	29.5	22.1	(51)	43.3		
			3/5	128.6	29.5	38.0	(51)	74.5	68.2	3/3 /43
	Soda Springs	6750	2/1	48.7	25.1	12.2	(42)	29.0	71.4	2/ 2/43
			2/11	57.5	31.5	18.1	(42)	43.1		
			3/1	101.7	26.8	27.3	(42)	65.0	77.4	3/ 1/43
	Donner Summit	6900	2/1	50.1	27.7	13.9	47.8	29.1	63.0	2/ 2/43
			2/11	63.4	32.3	20.5	47.8	42.9		
			3/1	105.0	26.1	27.4	47.8	57.3	74.9	3/ 1/43
	Ward Creek	7000	1/29	41.9	34.8	14.6	52.7	27.7	63.9	2/ 6/43
			2/26	72 1	37.9	27.3	52.7	51.8	77.0	2/28/43
Truckee	Independence Lake	8400	2/27	102.3	36.3	37.1	(47)	78.9		
	Independence Camp	7000	2/27	52.3	28.3	14.8	(26.5)	55.8	74.3	2/ 6/43
	Independence Creek	6300	2/28	47.7	24.5	11.7	(18)	65.0	61.7	2/ 6/43
	Sage Hen Creek	6500	1/29	26.9	23.0	6.2	(22)	28.2	75.0	2/ 7/43
			2/26	48.0	26.3	12.6	(22)	57.3	90.5	2/28/43
	Boca No. 2	5900	2/5	15.5	30.3	4.7	(9)	52.2	40.0	1/31/43
			2/27	27.4	27.0	7.4	(9)	82.2	63.3	2/27/43
	Truckee No. 2	6400	2/5	27.8	27.7	7.7	(20)	38.5	64.0	1/31/43
			2/27	41.7	26.9	11.2	(20)	56.0	75.5	2/27/43
	Donner Lake	5950	3/5	93 9	24.6	23.1	New course			
Tahoe	Tahoe City	6250	1/31	18.1	34.8	6.3	15.9	39.6	47.2	2/ 1/43
			3/2	44.0	25.9	11.4	15.9	71.7		
	Ward Creek	7000	1/29	41.9	34 8	14.6	51.2	28.5	65.8	2/ 6/43
			2/26	72.1	37.9	27.3	51.2	53.3	79.3	2/28/43
	Marlette Lake	8000	2/1	41.9	29.6	12.4	27.8	44.6		
			3/2	71.1	30.1	21.4	27.8	77.0	101.4	3/ 5/43
	Glenbrook No. 2	6900	2/27	39.5	24.3	9.6	(20)	48.0	72.0	2/28/43
	Daggett's Pass	7350	2/26	42.4	25.2	10.7	16.3	65.6	70.5	2/28/43
	Upper Truckee	6400	2/27	30.9	27.5	8.5	(11)	77.3	47.3	3/ 1/43
	Richardson's	6500	2/27	37.4	21.4	8 0	(13)	61.5	53.8	3/ 2/43
	Echo Summit	7500	1/30	48.7	32.0	15.6	(40)	39.0	77.8	1/27/43
			2/28	78.2	29.4	23.0	(40)	57 5	97.0	3/ 2/43
Carson	Carson Pass	8600	2/6	49.5	32.9	16.3	(48)	34.0	63.3	2/ 1/43
			2/27	71.2	31.5	22 4	(48)	46.7	85.6	3/ 1/43
	Blue Lakes	8000	2/1	55.4	25.4	14.1	48.1	29.3	67.6	1/31/43
			3/2	102.1	25.6	26 3	48.1	54.7	76.9	2/28/43
Mono	Tioga Pass	9900	2/26	62.0	27.9	17.3	(31)	55.8	94.5	3/ 2/43

APRIL 1, 1944, SNOW SURVEY DATA

Snow Survey Stations	Elevation feet	Date of 1944 Snow Survey	Depth of Snow Inches	Density of Snow % Water	Water Equivalent April 1 Inches	Normal Water Equivalent April 1 Inches	1944 Seasonal % of Normal	Last Year % of Normal
TRUCKEE BASIN								
Crest and South Yuba								
Furnace Flat	6600	March 27	87.2	43.9	38.3	(59)	64.9	77.6
Fordyce Lake	6500	March 28	74.3	47.4	35.2	(51)	69.0	78.0
Soda Springs	6750	April 1	56.5	46.5	26.3	(42)	62.6	94.0
Donner Summit	6900	April 1	61.8	49.2	30.4	47.8	63.6	86.0
Ward Creek	7000	April 1	67.9	45.4	30.8	52.7	58.4	98.3
Little Truckee								
Webber Peak	8000	March 30	79.0	41.8	33.0	56.9	58.0	86.5
Webber Lake	7000	March 30	62.3	43.7	27.2	38.1	71.4	106.6
Independence Lake	8400	April 3	81.8	38.5	31.5	(47)	67.0	107.2
Independence Camp	7000	April 2	46.7	43.0	20.1	(26.5)	75.8	90.9
Independence Creek	6300	April 2	32.2	41.3	13.3	(18)	73.9	77.8
Sage Hen Creek	6500	April 1	39.3	40.7	16.0	(22)	72.7	87.7
Eastern Outposts								
Granite Peak	8200	April 2	50.9	37.9	19.3	24.7	78.1	113.4
Big Meadow	8800	April 8	50.3	44.3	22.3	28.1	79.4	135.9
Mt. Rose	10,000	April 8-9	78.4	40.8	32.0	(45)	71.1	99.8
Lower Levels								
Boca No. 2	5900	March 31	15.4	37.7	5.8	(9)	64.4	0
Truckee No. 2	6400	April 1	37.5	38.9	14.6	(20)	73.0	67.0
*Donner Lake	5950	March 31	48.9	45.8	22.4			
Tahoe City	6250	March 30	24.1	46.9	11.3	15.9	71.1	54.7
TAHOE BASIN								
Crest Main Sierra								
Ward Creek	7000	April 1	67.9	45.4	30.8	51.2	60.2	101.2
Rubicon Peak No. 1	8100	April 2	81.5	36.8	30.0	48.9	61.3	115.3
Rubicon Peak No. 2	7500	April 2	55.4	42.1	23.3	(36)	64.7	104.4
Lake Lucile	8400	April 2	89.2	43.7	39.0	61.2	63.7	125.0
Echo Summit	7500	March 30	63.2	46.2	29.2	(40)	73.0	120.0
Eastern Outposts								
Mt. Rose	10,000	April 8-9	78.4	40.8	32.0	(45)	71.1	99.8
Marlette Lake	8000	April 1	54.4	44.7	24.3	27.8	87.4	123.0
Hagans Meadows	8000	April 3	31.9	42.0	13.4	21.2	63.2	89.2
Lower Levels								
Tahoe City	6250	March 30	24.1	46.9	11.3	15.9	71.1	54.7
Rubicon Peak No. 3	6700	April 2	50.3	36.2	18.2	(30)	60.7	72.3
Richardsons	6500	April 4	23.6	37.7	8.9	(13)	68.5	48.5
*Richardsons No. 2	6500	April 4	38.2	41.1	15.7			
Upper Truckee	6400	April 3	16.9	39.1	6.6	(11)	60.0	20.9
Freel Bench	7300	April 3	20.4	32.8	6.7	(15)	44.7	62.0
Daggetts Pass	7350	March 31	36.1	37.7	13.6	16.3	83.4	78.5
Glenbrook No. 2	6900	March 31	40.2	36.8	14.8	(20)	74.0	83.0
WASHOE VALLEY								
Marlette Lake	8000	April 1	54.4	44.7	24.3	27.8	87.4	123.0
Little Valley	6300	April 2	26.9	43.1	11.6			
CARSON BASIN								
Crest West Carson								
Carson Pass	8600	March 30	68.6	44.3	30.4	(48.0)	63.3	106.2
Blue Lakes	8000	April 1	71.6	39.8	28.5	48.1	59.3	96.3
East Carson								
Poison Flat	7900	March 31	37.9	39.1	14.8	(18)	82.2	105.6
WALKER BASIN								
West Walker								
Sonora Pass	8800	March 29	54.1	35.5	19.2	(31)	61.9	96.8
Leavitt Meadow	7200	March 28	33.8	35.5	12.0	(16)	75.0	51.2
Willow Flat	8250	March 31	40.9	37.2	15.2	17.5	86.9	88.6
East Walker								
Center Mountain	9400	April 6	75.4	39.4	29.7	45.7	65.0	
Buckeye Forks	8500	April 5	44.6	38.3	17.1	26.0	65.8	
Buckeye Roughs	7900	April 5	44.0	40.5	17.8	25.9	68.7	72.6
Dunderberg Peak	8400	April 8	45.3	37.3	16.9	(45)	37.3	82.0
MONO BASIN								
Crest								
Tioga Pass	9900	March 29	60.6	35.6	21.6	(31)	69.7	112.6

* NEW COURSES.

FORECAST — CENTRAL SIERRA — EASTERN SLOPE

APRIL-JULY, 1944

BASIN OR STREAM	Normals Feet	SEASONAL FORECAST			
		Probable		Possible Minimum	
		% of Normal	Amount Feet	% of Normal	Amount Feet
*Rise of Tahoe, April 1 to High Water	1.68	53.6	0.90	41.7	0.70
*Maximum Elevation of Tahoe	About June 15		6227.70		6227.50
	Acre Ft.		Acre Ft.		Acre Ft.
†Truckee, Exclusive of Tahoe	325,700	59.9	195,000	53.7	175,000
Carson at Ft. Churchill	230,000	39.1	90,000	32.6	75,000
West Walker near Chris Flat	191,200	57.5	110,000	49.7	95,000
§East Walker near Bridgeport Dam	73,000	45.2	33,000	38.4	28,000

*Assuming outlet gates kept closed—No outflow.

†Corrected for changes in Little Truckee Reservoir Storage.

§The forecast period for the East Walker is April-August because of late melting of snow in high altitudes and northeastern slopes of the Saw Tooth Range west of Bridgeport.

**Distribution of April-July Runoff in Typical Streams—
Per Cent of Total April-July Runoff**

	Truckee at Iceland Excl. of Tahoe	Carson at Clifton	West Walker at Coleville
April	32	19	11
May	38	36	29
June	23	34	37
July	7	11	23
April-July	100.0	100.0	100.0

A retardation in the earlier months of the series assures an increase in the later months and vice versa.

Table A, below, shows what Lake Tahoe is able to supply at various elevations with gates wide open. Table B, below, shows the need of drawing from the lake during the summer and fall to maintain a flow of 500 cubic feet per second at Iceland.

A. Draft Possible at Various Elevations:

Elev. (Ft).	Draft (C.F.S.)	Elev. (Ft)	Draft (C.F.S.)
6223.0	0	6225.5	520
6223.5	24	6226.0	730
6224.0	88	6227.0	1160
6224.5	183	6228.0	1600
6225.0	325	6229.0	2060

One foot depth on Tahoe is equivalent to 123,000 acre feet.

B. Natural Flow of Truckee River at Farad, Exclusive of Tahoe (Much Affected by Rains) August-October:

	Normal Acre Feet	Second Feet
August	7485	122
September	5800	98
October	6545	106

WINTER PRECIPITATION

*Typical Progress through winter for Central Sierra Region:

Dec.-March		Nov.-March	
Date	% Due	% Due	Date
Dec. 1	0	12	Dec. 1
Jan. 1	21	31	Jan. 1
Feb. 1	50	57	Feb. 1
Mar. 1	76	79	Mar. 1
Apr. 1	100	100	Apr. 1

† Seasonal Progress.

Tahoe City
Dec.-Mar. 1943-44

Date	% of Seasonal	Actual Inches	% of Normal Due
Jan. 1	11	1.55	34
Feb. 1	39	5.72	53
Mar. 1	75	10.97	65
Apr. 1	100	14.60	67

* Based on U.S.W.B. Revised Normals, % Due being averages for nine U.S.W.B. Stations in Central Sierra.

† Percent of Normal Due based on U.S W.B. Revised Normals for Tahoe City.

Nov.-March normal	24.81
Dec.-March normal	21.89

Reno, Nevada, April 25, 1944.

ASK FOR MORE COPIES IF NEEDED.

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